# SHACKLE ON CHOICE, IMAGINATION AND CREATIVITY: HAYEKIAN FOUNDATIONS

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Abstract

This paper develops a response to some of the criticisms that have been made of G.L.S. Shackle's analysis of human decision-making because of its reliance on a Cartesian account of the mind. It is argued that the basis for a response can be found in the work on theoretical psychology developed by Shackle's fellow-subjectivist, and one-time PhD supervisor, F.A. Hayek. In particular, the ideas advanced by Hayek in his 1952 book, *The Sensory Order* can be used to provide an account of the mind that avoids the shortcomings of Shackle's Cartesianism whilst still doing justice to Shackle's emphasis on genuine choice, on expectations, and on the role of creativity and the imagination in human decision-making.

JEL classifications: B2, B3, B4, B5

## 1. INTRODUCTION

This paper seeks to develop some aspects of the work of one of the most insightful heterodox economists of the twentieth century, namely G.L.S. Shackle. It does so by drawing on ideas from theoretical psychology and cognitive science in order to elaborate on Shackle's ideas about the nature and significance of creative decision-making. In doing so, it suggests how to it is possible to respond to some criticisms that have been made of Shackle's ideas, whilst retaining his emphasis on the importance of creative choice and the imagination in human decision-making.

One of the defining characteristics of Shackle's work is his commitment to the principle of subjectivism, that is, to the idea that what matters for understanding the behaviour of economic actors is not their objective circumstances *per se* but rather how they understand those circumstances. For Shackle, economics is fundamentally about meaning (that is, about how people interpret the situation in which they find themselves and how that interpretation leads them to act):

> 'Economics, concerned with thoughts and only secondarily with things, the objects of those thoughts, must be as protean as thought itself ... Economics is thought endeavouring to understand a world of action based on thought' (Shackle [1972] 1992: 246, xii).

Far from viewing human action as a simply a mechanistic response to external circumstances—a perspective that according to Shackle fails to do justice to the nature of genuine choice—Shackle contends that people's decisions are the end product of a creative process that can generate a variety of interpretations of, and therefore responses to, a given set of external circumstances. Consider, for example, a group of businessmen who find that the price of one of the raw materials used in the production of the good sold by their firms has increased. The price rise is an indication that the raw material in question is scarcer than it has been in the past (Hayek 1945). But divining the precise significance of the 'signal' provided by the change in price still requires significant interpretive work on

the part of the businessmen, who in deciding how to respond must consider such issues as: whether the price change is likely to be temporary or permanent; whether it indicates that they should simply reduce the level of output they produce or invest in new machinery that enables them to sustain previous levels of output whilst using less of the raw material in question; the extent to which there is scope for them to pass the costs of the price rise on to consumers; and so on. The subjectivism of decision-making manifests itself in the varied ways in which different businessmen in the industry interpret and respond to the information about the increased scarcity of the raw material provided by the rise in its price.

While interesting and insightful, Shackle's approach—summarised in Section 2.1 below—is vulnerable to criticism for a number of reasons. In particular, in arguing that genuine choice an 'uncaused cause' of new trains of action (1988: 2), Shackle adopts a Cartesian approach that renders the relation between the mental and the physical worlds unintelligible in a number of ways (Section 2.2). However, the intellectual resources required to resolve the problems with Shackle's account can be found in an insightful tract in theoretical psychology, *The Sensory Order*, written by another prominent subjectivist economist, Friedrich Hayek (1952). The relevant aspects of Hayek's account of the working of the mind are outlined in Sections 3.1 and 3.2, before being used to suggest how the problems posed by Shackle's Cartesianism can be resolved (Section 3.3). Hayek's insights can also be used to underwrite and develop various other prominent aspects of Shackle's account of the nature of creative choice, including the formation of expectations (Section 4.1), the nature of creativity (Section 4.2), and the way in which people's choices are also sensitive to, and channelled by, constraints imposed by the nature of the social and material world (Section 4.3). Section 5 summarises and draws conclusions.

## 2. SHACKLE ON THE NATURE OF CHOICE; EXPOSITION AND CRITIQUE

### 2.1 Shackle's account of choice

Shackle's central goal is to 'show the essential nature of choice' (p. vii; also see p. 4). He argues that 'choice', if the term is not to be emptied of all meaning, must have two key attributes.

The first is that genuine choice involves people pursuing a course of action that is more than just a mechanical response to their current situation. For Shackle (1979: 55), 'choices' that are uniquely determined by antecedent circumstances are illusory. Genuine choice, on his view, requires that people are imaginative beings who in any given situation are able to envisage goals, and ways of proceeding towards those goals, that are new in the sense that they are not implied by, or implicit in, their prior circumstances. On this view, choice is an 'uncaused cause ... the locus of *ex nihilo* imagination, the genesis of a taking place not wholly implicit in antecedents' (1979: viii; also see pp. 48-53). Put slightly differently, choice requires that society be an open system, in the sense that if in any given circumstances *x* a person chose to take action *y*, then (s)he could equally have chosen to undertake some other course of action not-*y* (1979: 7-9, 12, 18-19, 33).

Second, these originative choices have the capacity to change the set of events that take place in the world.[1] As Shackle writes, choice 'can shift the bounds of the range of rival possible sequels [of action] which the chooser can envisage, the skein of imagined sequels which are not blocked by some discernible obstacle' (p. viii; also see pp. 3, 6):

[1] 'To cause is to make a difference' (Shackle 1979: 49).

> '[C]hoice will remove what would have been discernible obstacles from some evolutions of affairs, some paths of history … for example by allocating means and operations essential to those courses of events, the absence of which would have blocked them. [In this way,] [c]hoice makes seemingly possible some imagined histories-to-come' (1979: 15).

It is the scope for people's choice to make a difference to the course of events in the world that motivates them to deliberate and, ultimately, to choose what to do (Shackle 1979: vii).

Shackle contends that, taken together, these two attributes of genuine human choice—its indeterminate character and its ability to make a difference to the future course of events—have an important implication, namely that the social world is characterised by radical uncertainty. The latter entails that, when people are deciding how to behave, it is impossible for them meaningfully to assign numerical probabilities to the various outcomes to which their actions might lead, so that their decisions cannot be assimilated to the calculus of probability and the language of mathematical expectation. The reason is as follows.

In an interdependent social world, the consequences of one person's actions inevitably depend on the conduct of other people: '[T]he sequel of any present choice of action which [a person] makes,' Shackle (1979: 9, 27) writes, 'will be partly shaped by choices made, by others or himself, in time-to-come' so that the future 'waits to be created, to be originated, by choices to be made, now and in time-to-come, by himself and others.' But if the future is the result of the (interplay between) the creative actions of a myriad of people, whose actions are not determined by their current circumstances, and if (as Shackle believes) those originative actions are unique events taking place in never-to-be-repeated circumstances (rather than repeated trials made under stable conditions), then people may be incapable of conceiving all the possible events that shape the outcomes to which their actions lead. The occurrence of such 'unknown unknowns' or 'black swans', as they are popularly known, is, therefore, a genuine surprise in the sense that it lies outside the confines of what people had hitherto imagined might happen (Taleb 2008; Runde 2009: 498-01). And where the consequences of people's decisions are determined by events that do not even register as possibilities for the decision-makers in question, then the evidential basis for the calculation of meaningful probabilities will be lacking (Shackle 1979: 52-60, 80-84):

> If choice is to be deemed capable of making a difference, if choice is to be deemed effective and originative, it follows that what will be chosen, is essentially, ineluctably unforeknowable. If by choosing we can *originate* history, then others in times-to-come can also give to the course of things impulses know unforeknowable which will affect the sequel of the choice we now make … [A] world of effective choice … is a world of *essential unknowledge*. (Shackle 1979: 145, 84)

About such matters, as Keynes famously put it, 'there is no scientific basis on which to form any calculable probability. We simply do not know' (1937: 214).[2]

[2] Put more formally, the problem to which creative decision-making gives rise is that the state space—that is, the set of states of the world that determine the consequences to which a decision-maker's actions lead—is incomplete. The novel outcomes produced by creative decision-making, such as the development of new technologies or products, violate one of the key presuppositions of the theory of rational choice under uncertainty, namely the assumption that people possess from the outset a comprehensive list of all the various possible states of the world that are relevant to their decisions. This assumption, which is variously known as the 'small-world' or 'grand state space' assumption, rules out the possibility of new, previously unimagined events. In doing so, it helps to ensure that the rational actor faces a well-defined decision-problem in which sharp, numerical probabilities can be attached to the consequences of the courses of action open to them. However, originative decision-making, and the genuine novelty it introduces into the economic process, makes it impossible for people to specify in advance all the possible

Shackle argues that people cope with their ignorance or 'unknowledge' of the future, and so manage to act in a purposeful way, by using their (subjective) imaginations to envisage desirable future scenarios and then deciding which actions might bring them about:

> Economic choice does not consist in comparing the items in a list, known to be complete, of given fully specified rival and certainly attainable results. It consists in first creating, by conjecture and reasoned imagination on the basis of mere suggestion offered by visible or recorded circumstance, the things on which hope can be fixed. These things, at the time when they are available for choice, are thoughts and even figments. (Shackle [1972] 1992: 96.)

For Shackle, then, people act in the face of radical uncertainty by choosing between various conceptions or images of the future that they themselves have developed through the exercise of their creative imaginations. 'Choice is necessarily made amongst works of thought, of imagination,' Shackle writes (1979: 2).[3] And having settled on a particular vision as to one to pursue, people then act in such a way as to remove perceived obstacles to its being realised and/or put in place requirements for it to be achieved (Shackle 1979: 2, 7, 11-12).

For Shackle, the cognitive process through which people reach a decision about how to respond to (changes in) their circumstances involves them classifying external events by reference to their (dis)similarity to the various kinds of events and situations experienced in the past. Shackle highlights three main aspects of this process.

First, people receive sensory impressions, generated by events or 'takings-place' in the external world (the *Field*, as Shackle terms it). These 'reports from [the] field', as Shackle terms them, are the way people gain news about that is going on in the external world (1979: 2-3, 23).

Second, people draw upon a repertoire of shared concepts in describing their beliefs about the working of the natural and social worlds—the *Scheme*, in Shackle's lexicon—in order to sort and classify the raw sense data, thereby producing useful information or *News*. 'The first act of any kind of understanding,' Shackle (1979: 121) writes, 'is to classify. To describe a thing or an event is to place it in a class pre-existing by general public convention.' The vehicle for this classificatory process, the medium in which it takes place, is language. For in learning how to use the symbols associated with a particular language—in learning, for example, what counts as a 'musical instrument' or a 'fridge'—people acquire a framework for conceptualising the world around them. '[L]anguage is the outward shape of thought,' Shackle ([1972] 1992: 185) maintains, 'the form which is inseparable from the content.' Significantly, in addition to specifying what it is count as a particular kind of event or situation, the linguistic conventions or rules that govern the process of classification also indicate how one ought to respond to such circumstances. As Shackle puts it, the categories provide 'instruction[s] for practice' (1972: 51). Therefore, having assimilated an event or state of affairs to one of the pre-existing categories—for example by classifying a rise in the price of a raw material price as being akin to one that in the past proved to be only temporary—the decision-maker will be able to draw on the recipe of responses

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states of the world in which they might be called upon to act, and which might shape the consequences of their actions. The upshot is that 'in many decision problems under uncertainty states of the world are neither naturally given nor simply formulated … often even a comprehensive list of all possible outcomes is not readily available or easily imagined' (Gilboa and Schmeidler 1995: 606; also see Feduzi and Runde 2014: 11-12).

[3] For more on this, see Runde (2000) and Zappia (2014: 1136-39).

associated with that kind of situation in order to decide how to respond (e.g. by choosing to hunker down, absorb the higher raw materials costs for a while, and wait for the price to fall once again).

Third, and relatedly, while Shackle views people as imaginative beings who are able create the images of the future they choose to pursue, their imagination does not have completely free reign. On the contrary, it 'must observe constraints … [In particular, it] is required to conform to Nature and human nature' (1979: 8, 13). The constraints in question are imposed by the nature of the Field—that is, by the nature of the external social and material world—and only those goals whose realisation is (thought to be) consistent with such constraints are worthy of serious consideration: 'Imagined filling of time-to-come must, in order to serve its purpose, be deemed possible … Choice is amongst skeins of possibilities, the Imagined, deemed Possible' (Shackle 1979: 8, 79).

One question to which this account of decision-making gives rise concerns whether people's reliance on inherited (given) recipes or instructions for action leaves scope for novel responses associated with entrepreneurial creativity, whereby people use their creative powers of their imagination to devise new ways of dealing with familiar kinds of situation (e.g. by introducing new products and production techniques). In Shackle's own words:

> Is it not then a fundamental problem for us, enquirers into choice, to explain how history-to-come can be imagined by the chooser, originated in diverse mutually rival forms, yet be concerned with, and therefore composed of, entities in some sense given? ... What will reconcile these two ostensible incompatibles? (Shackle 1979: 15-16.)

The answer, for Shackle, lies in the flexibility and generative potential of the language that expresses our thoughts:

> A language can express a limitless ... variety of thoughts but it composed of symbols of somewhat stable and suggestive content. The source of the suggestions, which resides in a word or sentence, is somewhat determinate and given by convention. The suggestions which it might inspire are by contrast unbounded in character and number ... The endeavour to use some term in the service of an idea which has, at least for its proposer, something of its own invention, some glint of original conception and novelty, necessarily throws upon this term a light from an angle unfamiliar to other users. The term is obliged to share to some degree the novelty which it seeks to address. It has to express that somewhat novel meaning, or construction of ideas, by suggestion, it has, if it is to succeed in its task, to induce in the hearer's or reader' thought a leap of intuition imitating that of the proposer of the supposedly original thought. Thus the bundle of meanings of this term is added to, its effect as a whole is somewhat changed, enlarged, or changed with a force that is new to it. (Shackle 1979: 122, 136).

For Shackle, then, people are able to act in a purposeful, creative, goal-driven fashion even in the face of radical uncertainty through the disciplined exercise of their imagination to create an image of the future which they then attempt to realise through their actions.

2.2 Criticisms of Shackle's account

At least three sets of problems arise with Shackle's account of choice. As we shall see later in the paper, all three can be dealt with by invoking Hayek's theoretical psychology as a cognitive scientific foundation for what Shackle has to say

First, in suggesting that people receive simple sense impressions from the field, which they then interpret to form the 'News', Shackle's approach is inconsistent with the evidence provided by phenomenologists and gestalt psychologists. For the latter indicate that, rather than experiencing basic sensations, which they then interpret in order to form images of the world, people simply experience a pre-interpreted world, seeing 'a chair; or 'a shop'.

A second set of problems with Shackle's approach stems from the way in which he draws a sharp distinction between the person or 'thinking being' (*res cogitans*), on the one hand, and the Field or external world (*res extensa*) on the other (1979: 3, 21, 93) (Hodgson 2000: 57-58). In doing so, Shackle adopts a form of Cartesian dualism, whose starkest and—for our present purposes—most significant manifestation is Shackle's belief that genuine choice an 'uncaused cause' of new trains of action. As several commentators have noted, this kind of dualism is problematic, because it renders the relation between the mental and the physical worlds unintelligible in a number of ways. First, it does not address, let alone answer, the question of how the non-material causality involved in people's mental lives is translated into the material causality of their physical lives (as for example when a person decides to move his hand and then actually does so). Second, such an approach struggles to explain what happens when the two types of cause work against one another. Third, by suggesting that non-material, uncaused actions of the mind can cause movements in physical matter, and thereby create energy, dualism appears to violate the law of the conservation of energy. Fourth, it also fails to do justice to evidence concerning the biological and, ultimately, the micro-physical causes of mental disorders (Bunge 1980: 2-5, 16-21; Hodgson 2000: 55-60; Searle 1997: xii-xiii; de Vries 1994: 315-16).

A third shortcoming with Shackle account of choice is that while the analogy between creative choice and creative use of language is highly suggestive, Shackle does not develop the analogy between linguistic and entrepreneurial creativity in order to advance a convincing account of the latter. Consequently, he leaves unanswered certain key questions. For example, how precisely are novel meanings generated from individual terms whose meaning is well established? And what is the significance of such linguistic novelty for creative choice in the *economic* realm?

In what follows, we aim to use Hayek's theoretical psychology to place Shackle's account of choice on firmer psychological foundations. To that end, we turn in the next section of the paper to Hayek's account of the working of the mind, as presented in his book *The Sensory Order* (Hayek 1952).

## 3. HAYEK THEORETICAL PSYCHOLOGY: *THE SENSORY ORDER*

### 3.1 Hayek's theoretical psychology: an outline

We consider first whether the Shacklean account of emergence outlined above resonates with Hayek's analysis of human cognition, as presented in his 1952 book *The Sensory Order* (Hayek 1952). The task Hayek sets himself in that work is to explain why the phenomenal (subjective, mental) picture of the world provided by our senses differs from the physical order revealed to us by the natural sciences. The starting point for Hayek's analysis is the fact that objects that appear to be altogether different to us may exhibit very similar physical properties, while objects that closely resemble each other in sensory terms may display very different physical relations to one other. The task of theoretical psychology, for Hayek,

is to show how the human central nervous system constitutes a classificatory structure that is capable of discriminating between different physical stimuli so as to give rise to the sensory order that we actually experience (Hayek 1952: 2-8, 13-19, 37-40, 47).

For Hayek, the human central nervous system consists of a hierarchical network or structure of interconnected nerve fibres or neurons. When an external event stimulates a sensory receptor, an electrical impulse passes along a nerve fibre running from that receptor. If the stimulus is sufficiently strong, then that neuron will generate outgoing impulses that can in turn excite other neurons with which the first is connected, causing them to 'fire'. In this way, an ongoing sequence of neural impulses is generated that culminates in the initial stimulus being transmitted to the brain. Neurons in which impulses often occur together tend to become connected to each other, so that over time the nervous system acquires a structure, in which the position of any one neuron is defined by its connections to other nerve fibres.

The fact that neurons assume a particular structure is important for the following reason. If a person is to recognise a sensation as an instance of a particular type of sensory quality, it must be differentiated from other types of sensation. Individual nerve impulses are physically identical to one another, so the existence of the different sensory qualities cannot be the result of differences in the attributes of individual impulses (Hayek 1952: 10, 56). Rather, Hayek argues that the existence of the sensory order is best explained by reference to the relationships between those impulses, relationships that ultimately arise because the impulses in question are carried by neurons that occupy specific positions within the structure of the nervous system. Hayek's theory of the mind is relational, therefore, in the sense that it is the structure of the connections between nerve fibres that governs people's cognitive processes and which accounts for the key features of our mental experience (Hayek 1952: 12).

To see why, note that the (primary) nerve impulse generated by a particular external stimulus will in turn stimulate neurons connected to those along which that primary impulse is transmitted. In this way, the external stimulus leads to the generation within the central nervous system of an induced pattern of (secondary) nerve impulses, characteristic not only of the external stimulus currently being experienced but also of the other external stimuli that have typically accompanied it in the past. This train or wake of (secondary) impulses is termed by Hayek the *following* of the initial nerve impulse (Hayek 1952b: 63). And, according to Hayek, it is by classifying external physical events according to the extended pattern of nerve firings or followings they trigger that the central nervous system distinguishes them from one another and thereby creates distinct sensory data. Two external events are classified as the same—and so are experienced as having the same sensory qualities—if they stimulate the same configuration of neurons and so trigger an identical following. Events that excite different groups of neurons, and so generate different followings, are placed in different categories and therefore produce different sensations (Hayek 1952b: 48-54, 62-78). On this view, it is not the similarity of external events *per se* that causes them to be placed in the same class, and hence to be experienced in the same way, but rather the fact that, when they stimulate a receptor organ, they produce the same extended pattern or following of nerve impulses within the central nervous system.

Herein lies the essence of Hayek's attempt to complete the explanatory task he set himself in the *Sensory Order*, namely that of showing how it is possible that 'from the known physiological elements [of the nervous system] a structure can be formed which can differentiate between different impulses passing through it in exactly the same manner in which our sensory experience differentiates between the different stimuli' (Hayek 1952: 18; also see p. 47). For Hayek, external events stimulate the growth of an organised structure of nerve fibres that reproduces, albeit imperfectly, the patterns of events found in the external environment, in the sense that the structure of connections between the neurons corresponds

topologically to the structure of the relations between some of the external stimuli that impinge upon the person in question. And by reproducing at least some of the regularities obtaining between external events, the structure of neural connections or neural order that arises within the brain provides an approximate, and evolving, 'map' of the external, physical order (Hayek 1952: 7, 42, 64, 68-69, 107-112, 198). In this way, according to Hayek, it is the set of connections between neurons that creates the classification of external stimuli that gives rise to the sensory or phenomenal order. Indeed, on Hayek's account, the neural order—that is, the set of connections between nerve fibres in the brain, and the impulses proceeding in them—that is produced in this way *just is* the sensory order of phenomenal experience (Hayek 1952b: 40). Ultimately, the chain of impulses initiated by an external stimulus leads—via a non-mechanical, neurophysiological process whose ultimate outcome depends not only on that stimulus but also on the set of impulses that was already coursing through the person's nervous system when the stimulus in question was received—to the triggering of various dispositions or propensities to act in particular kinds of ways in certain types of situation (Hayek 1952b: 79-96, 112-27, [1964] 1967: 57, [1969] 1978: 38-42, 1982: 289-90).

It is significant for our present purposes that, on this view, people do not have simple sensory experiences which they then interpret and aggregate into the objects we actually, experience. On the contrary, according on Hayek, external stimuli are classified by the mind in such a way that people experience a pre-interpreted world, simply seeing – say – a chair or a sheep from the outset. As Hayek put it, 'Every sensation, even the "purest", must ... be regarded as an interpretation of an event in the light of the past experience of the individual or the species' (1952: 166). It is for this reason, of course, that Hayek entitled one of his essays, 'The Primacy of the Abstract' ([1968] 1978). His point is that, because observation depends upon the rule-governed, classificatory activity of their minds, the richness of the sensory world 'is not the starting point from which the mind derives abstraction, but the product of a great range of abstractions which the mind must possess in order to be capable of experiencing that richness of the particular' ([1968] 1978: 43). Abstract categories and classificatory rules come first, concrete observations only later.

It will also turn out to be significant for dealing with some of the other problems posed by Shackle's account of choice, as we do in Section 3.3 below, that Hayek conceptualizes the mind as *relational* in nature. The capacity to discriminate between stimuli, and in that way to classify them and to generate the sensory order, is a property that is possessed, not by the individual neurons taken in isolation, but only by the structured entity that is formed when the nerve fibres are arranged as an ordered hierarchy (Hayek 1952: 35, 46-47). In Hayek's theory, then, it is the structure of the connections between nerve fibres that governs people's cognitive processes and accounts for the key features of our sensory experiences. As Hayek puts it, 'The connections between the psychological elements are thus the primary phenomenon which creates the mental phenomena ... the whole set of [the sensory qualities evoked by a particular external event] is determined by the *system of connections* by which the impulses [produced by that stimulus] can be transmitted from neuron to neuron ...it is thus the position of the individual impulse or group of impulses *in the whole system of such connections* which gives them its distinctive quality' (Hayek 1952b: 53, emphasis added; also see pp. 12, 147) (cf. Archer 1982: 475).

### 3.2 Hayek's theory of the mind and emergent properties

It will be useful for understanding how Hayek's theoretical psychology can help to overcome some of the difficulties with Shackle's account of choice to bring out explicitly one important aspect of Hayek's

analysis of the mind, namely its reliance on the notions of emergence and emergent properties (Lewis 2012).

If the brain is a structured arrangement of neurons, then its ability to give rise to the sensory order, to generate expectations, and to formulate and act on plans, is an emergent causal power of the structured array of neurons that is the human mind. The term *emergence* denotes the way that, when certain elements or parts stand in particular relations to one another, the whole that is formed has properties that are not possessed by its constituent elements taken in isolation. The properties that arise when the elements are arranged in the requisite way are known as *emergent properties*, while any whole that possesses an emergent property is known as an *emergent* or 'higher-level' entity. Emergent properties are structural or relational in the sense that their existence depends not only on the presence of their ('lower-level') constituent parts but also on those parts being organised or arranged into a particular structure that involves them standing in specific relations to one another (Bertalanffy 1971: 54; Elder-Vass 2007a: 28; Lawson 2012a: 348-49).

The notion of emergence suggests that reality is stratified in the sense that there is a hierarchical structure of ontologically distinct 'levels', each of which has its own distinctive properties including causal powers). These levels include the physical, the chemical, the biological, and—significantly, as we shall see below—the mental, as well as the individual and the social. The existence of entities in the higher strata always depends upon their constituent and lower-level components, but at the higher levels there are emergent properties that arise only as a result of the relations that obtain between lower-level entities and which are ontologically, causally and explanatorily irreducible to the properties of those lower-level entities taken in isolation. While it may be possible to explain the existence of the emergent properties, in the sense that one can give an account of how the properties or causal powers of an emergent entity like water result from the properties of its parts and the interaction that takes place between them when they are arranged the specified way, that is not the same thing as an *ontological* or *causal reduction* in which the emergent entity itself is shown to consist of nothing more than its lower level elements so that, in particular, its causal powers are reducible to the causal powers of those elements taken in isolation.

To see why, suppose that we have an explanation of an emergent property in terms of (i) the constituent parts of an emergent entity H, and (ii) the relations that obtain between those parts when they are organised into the form of an H. In that case, while we can to give an account of how the property arises as a result of the causal interaction between the parts when they are an H, we have done no more than explain that emergent property in terms of a *system*—the parts *and* their relations—that exists *only* when the emergent entity H exists. Neither ontological nor causal reducibility follow. The reason is that the existence of the emergent property depends not only upon the presence of the relevant parts but also upon their being organised or arranged in such a way that the particular set of relations characteristic of the entity like H obtains between them. If the parts in question were not organised to form an H—if the relevant system were not formed—then the causal influence that depends upon the parts being arranged in that particular way would not be manifest. It follows, therefore, that the causal power is a *sui generis* property of the relational organisation of the parts when they form an H, not of the individual parts taken either in isolation or as an unstructured aggregate (Lawson 2012a: 352). On this view, an emergent entity like H consists not only of its constituent parts but also of the structure of relations that obtains between them. It is the importance of the relational organisation of the parts for the existence of the emergent causal power that precludes ontological and causal reduction and to which the description of those parts as forming a system is meant to draw attention.

The ontological and causal reducibility of the emergent entity H implies that it, and more specifically its emergent system-level causal powers, cannot be excised or eliminated from causal explanations that depend on the exercise of that emergent entity's causal powers. Any causal explanation that depends both upon the properties of the parts and also on how they must be related to form an H is in effect an explanation in terms of that emergent entity's system-level casual powers. For example, while we can explain the liquidity of water in terms of its atomic constituents and the relations (chemical bonds) obtaining between them when they assume the form of water molecules, the property of liquidity is an emergent property that obtains only when the emergent entity, water, is present. The causal power to extinguish fires and to slake one's thirst is a property of water, not of the individual atoms of which it is composed. It is a property of the whole and cannot be understood merely through a separate analysis of each of the components. It follows, therefore, that causal explanations of how fires can be extinguished or thirst quenched have to make reference, if only implicitly, to that emergent entity, because it only when hydrogen and oxygen atoms are arranged into the form of water that the relevant causal power is present (Elder-Vass 2007b: 415; emphasis added; Elder-Vass 2007a: 30-3; Lawson 2012a: 350-53).

To bring the discussion back to Hayek's theory of the mind, recall first of all that—as seen in section 3.1 above—Hayek argues that people's capacity to engage in mental activity arises only when the individual nerve fibres are arranged so as to form a structured, hierarchical whole. Those capabilities are, therefore, emergent properties; their bearer is the higher-level or emergent entity, namely the human mind, that is formed when a set of nerve fibres is arranged into the type of structure that is required to facilitate the classification of external stimuli and to respond to those stimuli in the complex, rule-governed way described by Hayek (Butos and Koppl 2006: 40-43; McQuade 2006: 59; Lewis 2012). On this view, while various aspects of human decision-making would not exist in the absence of those neurons, and of the electrical impulses that travel along them, consciousness, expectations-formation and choice are nevertheless irreducible, both (i) ontologically and (ii) explanatorily, to neural activity. The emergent properties are ontologically and causally irreducible to the (properties of) individual nerve fibres because they possessed only by a particular whole—namely the hierarchically ordered arrangement of neurons found in the human brain—and not by those neurons taken either in isolation or as an unstructured aggregate or group (see Hayek [1964] 1967: 26). And the emergent whole—the neurons *plus* the relations that obtain between them—is explanatorily irreducible in the sense that it cannot be eliminated without loss of understanding from causal explanations of the generation of the sensory order —and other human behaviour—because, if the nerve fibres were not related in such a way that at least some stimuli give rise to different followings, then it would be impossible to discriminate between and classify different stimuli in the way required to produce distinctive sensory qualities, etc.. On this account, therefore, the unique causal powers of human mind—including its capacity to imbue events with meaning and to initiate courses of actions in a purposeful fashion, as well as its ability to generate the phenomenal world of sense experience—all follow from the fact that the neurons of which it is composed would not behave in the ways characteristic of the human mind if they were not constituted into such a mind by a particular type of physiological/neural relationships. As Hayek puts it, even if we could identify in complete detail the physical mechanisms underpinning some classificatory process, 'We should still have to use the old [mental] categories, though we should be able to explain their formation and though we should know the physical "facts" behind them' (1952: 87). It follows, therefore, that the human mind, and associated mental properties such as purposes, beliefs, and so on, cannot be eliminated

from our causal explanations of human behaviour (cf. Elder-Vass 2007b: 415; Searle 1997: 22, 29-32, 144, 212-13).

3.3 Hayekian psychological foundations for Shackle's account of choice

The significance of all this for Shackle is that Hayek's theoretical psychology can provide an account of the working of the mind that does justice to the importance of the (mental) aspects of choice emphasised by Shackle, such as genuine choice and purposefulness, without lapsing into the Cartesian dualism—that is, the idea that there exists a sharp distinction between the material and mental worlds, with the latter consisting of a separate immaterial substance known as 'the mind'—invoked by Shackle (1979: 3, 21, 93). Cartesianism's sharp division between the physical causation found in the material world and the intentional causation characteristic of the mental world manifests itself in Shackle's reluctance to countenance any kind of causal antecedent to people's choices and, in particular, in his notion of choice as an 'uncaused cause'.

As noted in Section 2.2 above, this mind-body dualism has been criticised for rendering the relation between the mental and the physical worlds unintelligible in a number of ways. However, as we shall see, it is possible to reformulate Shackle's account of the mind in such a way as to resolve the problems posed by his Cartesianism whilst continuing to do justice to his emphasis on creative choice and the imagination. The requisite conceptual resources can be found in Hayek's theoretical psychology and, more specifically, in the emergent causal powers materialism that characterises Hayek's account of the mind (cf. Bunge 2000: 6-9, 21-25; Lawson 1997: 63-64, 175-77; Hodgson 2000: 59-65). As we have seen, Hayek's portrays mental phenomena, not as consisting of distinctive 'mental stuff' that exists independently of the physical and biological world, but rather as an emergent property of the structured array of neurons that is found in the human brain (Hayek 1952: 177-79). So the relationship between the mental and physical worlds, so opaque in the Cartesian approach adopted by Shackle, is now conceptualised in terms of the notion of emergence. The concept of material causality is retained, but the causal interaction between nerve impulses can now be seen to support a set of distinctive higher-level (mental) properties such as consciousness, intentionality, and so forth. The higher-level emergent casual powers arise out of, and only operate through, the lower-level neuro-physiological processes, so that there is not a proliferation of types of causation at any one ontological level, but they are nevertheless—as we have seen—irreducible to their lower-level counterparts.

Consistent with Shackle's views, therefore, Hayek's theoretical psychology portrays people as subjective beings who, far from responding passively to any given situation, posses the emergent capacity actively to interpret the world around them and to imbue the world with meaning. But there is no room left for the notion of human choice as an uncaused cause. Rather, people's choices are grounded in, and shaped by, the neural networks found in their brains, without however—as we have seen—being ontologically or explanatorily reducible to them. While people possess the emergent causal power to make decisions, etc., that capacity is not entirely ungrounded or unrestricted. Rather, it is grounded in, and so both facilitated and constrained by, the neural networks in the human brain along with the dispositions to which they give rise. Moreover, as we shall discuss in the next section of the paper, Hayek's account is one that suggests that people are creative beings who can respond differently to the same set of external circumstances.[4]

[4] To put this point slightly differently, Hayek portrays the brain as a decentralised system that has no orchestrating Cartesian self, no central locus of control, but which alters its own functioning through its own adaptive, self-regulating activities. On this view, our mental life is a spontaneous order, the unintended (emergent) outcome of the rule-governed interactions of a myriad of neurons. There is no directing, over-arching 'self',

## 4. OTHER WAYS IN WHICH HAYEKIAN THEORETICAL PSYCHOLOGY SUPPORTS SHACKLE'S APPROACH

In this section, we explore other affinities between Hayek's model of the mind and Shackle's account of choice, concerning in particular the formation of expectations, creativity, and the notion of 'practical conscience' (that is, the way in which people's choices, though creative, are also sensitive to the constraints imposed by the nature of the social and material world).

### 4.1 Mental experimentation before action: map and model

The connection of neurons that is formed in the human brain constitutes a 'map' that reproduces the relations between classes of events in the external world, thereby representing the latter. The map is static in that, as we have seen, it reflects the kinds of stimuli that have impinged upon a person in the past and—for reasons that will be described in more detail below—it represents the world in a way the person has found useful in the past. At any given moment in time, the map provides a theory of how the world works and the interpretive framework by reference to which new stimuli are categorised. Relative to 'the constantly-changing pattern of impulses', Hayek writes, 'it can be regarded as semi-permanent' (1952: 115).

Hayek goes on to note, however, that the map does not indicate 'what particular events will be recorded at any given moment' (1952: 115). Rather, the current interpretation of the world is provided by the pattern of impulses that is currently proceeding through the structured arrangement of neurons or map in a person's brain. Those impulses constitute a *model* of the situation in which the person currently finds him- or herself in at least two important ways. First, as we have seen, the impulses give rise to a classification of incoming stimuli, thereby generating a representation of the person's current circumstances. Second, and relatedly, that representation is *forward-looking* in that it draws attention to events that have in the past tended to accompany the ones currently being experienced and which therefore might accompany them now, so that the person begins to anticipate or expect their occurrence on this occasion too (Hayek 1952: 107-18). The map is thus the more dynamic, conjectural counterpart of the model.

We can elaborate on this point by recalling that the (primary) nerve impulse generated by a particular external stimulus in turn stimulates neurons connected to those along which that primary impulse is first transmitted. In this way, the external stimulus generates an induced pattern of (secondary) nerve impulses or associations that are characteristic not only of the external stimulus currently being experienced but also of the other potential external stimuli that have typically accompanied it in the past (Hayek 1952: 118). This pattern of impulses can therefore be described as a *model* of the current environment because, in addition to classifying the stimulus that is currently being experienced, it also draws attention to—and so disposes people to notice—other (potential) stimuli with which the original stimulus has been associated in the past (1952: 140). In generating these secondary impulses, the individual's model 'will thus continually tend to run ahead of the actual situation', generating heightened awareness or expectations of certain possible future stimuli that typically accompanied the ones currently

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detached from the functioning of the configuration of neurons in the brain, that oversees and directs the operations of the brain. In Hayek's words, 'Our mental activities are not guided by the particulars at which they are consciously directed, or of which the acting mind is aware, but by abstract rules which it cannot be said to know yet which nevertheless guide it' (Hayek [1968] 1978: 39) (also see Dempsey 1996: 25-27, 33).

being experienced, even when the latter are not currently present. In Hayek's words, the model 'will thus function as an apparatus of orientation by representing both the actual state of the environment and the changes to be expected in that environment' (1952: 120, 118). Moreover, given that the events to be classified include the person's own actions, and the consequences thereof, the expectations generated by the model include the possible consequences of the person's own actions. As Hayek puts it, in a passage Shackle would surely have relished:

> The representation of the existing situation in fact cannot be separated from, and has no significance apart from, the representation of the consequences to which it is likely to lead. Evan on a pre-conscious level, the organism must live as much in a world of expectation as in a world of "fact", and most responses to a govern stimulus are probably determined only via fairly complex processes of "trying out" on the model the effects to be expected from alternative courses of action. The reaction to a stimulus thus frequently implies an anticipation of the consequences to be expected from it. (1952: 121)

In this way, the model enables a person to 'try out' in his or her mind various possible courses of action along the line indicated by Shackle, through their possible consequences in a way that enables the person the person, fallibly of course, to choose the preferred one (1952: 122-26) (Butos and Koppl 2006: 39-40).

Significantly, because the working of the classificatory apparatus that underwrites the process of expectations-formation and decision-making depends not just on external circumstances but also on the pattern of impulses passing through the nervous system at any moment in time, it will 'scarcely ever respond twice in exactly the same manner to the same external circumstances'. On the contrary, it will give rise to 'entirely new actions' and behave in a 'self-adaptive and purposeful way' (1952: 122-23). In other words, as did Shackle, Hayek's account of the working of the mind and the nature of choice suggests that the world must be an open system in the same that in any given external situation (x) a person who choose action (y) could equally well have selected a different action (not-y).[5]

What we have here is a theoretical-psychological account of the formation of the kind of expectations emphasised by Shackle. Just as Shackle argues that people choose between various conceptions or images of the future that they themselves have developed through the exercise of their creative imaginations, so too can we see in Hayek's account a portrayal of people as choosing between alternative courses of action on the basis of their anticipated consequences and an account of the generation of those expectations as involving the creative—but, as we shall see, disciplined—exercise of people's imagination. Moreover, like Shackle, Hayek portrays these expectations as being eminently fallible. This reflects the fact that, as Hayek makes clear, the correspondence between the map and the real world is only approximate, so that the former represents the latter only 'in a partial and imperfect manner', providing 'only a very distorted reproduction of the relationships existing in the world' (1952: 145). Consequently, 'the classification of events provided by that map, and the models to which it gives rise at any given moment in time, 'will often prove to be false, that is, give rise to expectations which are not borne out' (1952: 145; also see Hayek 1973: 102-04, 1976: 130).

Over time the expectations created by a particular model will be evaluated against the newly arriving impulses that record the events actually taking place in the person's environment. Models, and the map or neuronal structure that embodies them, which yield accurate predictions and so help the person

[5] As noted above , on Hayek's account people have their own *sui generis* causal powers, including the capacity to make plans and decisions, so that their action are not causally reducible to antecedent circumstances.

to achieve his/her goals, are strengthened, so their impact on people's behaviour will grow. In contrast, where a model generates expectations that are often disappointed, so that it does little to assist the person in achieving his/her goals, then the neuronal connections that underpin that model will be weakened and their impact on people's behaviour will diminish. In this way, via an evolutionary process in which the criterion of selection is the accuracy of the expectations to which a model or configuration of neurons gives rise, the model and underlying map will be constantly checked against, and revised in accordance with, new impulses as they are received by the person.[6] In particular, the discomfort occasioned by a failure to accommodate some new phenomenon within an established pattern provides the stimulus to create a new interpretive scheme by a rearrangement of connections, which leads to a redefinition of categories. In this way, as we shall elaborate in the next section, experience provides the stimulus to experiment with new connections as the mind searches for ways of dealing with recalcitrant stimuli. And, as we shall also see, this account of how recalcitrant stimuli prompt the development of new neural connections prompted by will be developed into a Hayekian discussion of creativity that will be shown to dovetail well with Shackle's own views on the human imagination.

4.2 Creativity, Language and Metaphor

It was noted above that, on Hayek's account, the working of the human mind is relational in the sense that the capacity to classify stimuli, and thereby to generate the sensory order, is possessed only by a structured arrangement of neurons, not by those neurons taken either in isolation nor as an unstructured grouping. For Hayek, it is the structure of the linkages or connections between nerve fibres that governs people's cognitive processes and accounts for the key features of our sensory experiences. One implication of Hayek's account, which will turn out to be important for developing both Hayek and Shackle's accounts of the creativity and the imagination, is its implication that a new phenomenon—a new events or object—can only be perceived and understood in terms of its relations of similarity and dissimilarity with other, currently better understood events and objects. Something that is completely unique, and so cannot be related in any way to something already familiar, cannot even be perceived (Hayek 1952: 64, 142-43).[7]

To see why the relational nature of the operation of the mind is important for understanding creativity and the working of the imagination, we need to elaborate briefly on the way in which Hayek treats conceptual thinking in *The Sensory Order*. The key point is that the set of secondary nerve firings or followings that provides the basis for the initial classification of an external stimulus, and thereby for its being experienced as having a particular kind of sensory quality, is itself an event subject to classification. Just as the central nervous system tends to form connections between neural pathways activated by external stimuli that are usually experienced concurrently, so too does it form connections between sets of secondary nerve fibres that tend to be stimulated together. The secondary followings generated by a particular primary impulse will themselves activate neurons connected to those along which that secondary following is transmitted. Each set of secondary impulses will therefore generate an induced pattern of *tertiary* nerve impulses, characteristic not only of the sensory quality currently being experienced but also of the other sensory qualities that have typically accompanied it in the past. This train or wake of tertiary impulses—the following of the initial following, so to speak—provides the basis

[6] The mind, Shackle notes, is 'an instrument, not an instrument of unchanging conformation and design, but one continually developed and modified by the incoming reports and by the endeavour to interpret today's, this moment's, report in the light of the Scheme which has grown from all earlier reports' (1979).

[7] 'It is only insofar as the nervous system has learnt…to treat a particular stimulus as a member of a certain class of events … that an event can be perceived at all' (Hayek 1952:166).

for the classification of the sets of secondary impulses and of the sensory qualities to which they give rise. Two followings, and the sensory qualities they cause, are classified as the same only if they stimulate one and the same tertiary following. So, for example, if a particular external stimulus is, in virtue of the secondary following to which it gives rise, classified as the colour 'blue', then the classification of the associated secondary following may in turn give rise to the idea that it is a 'bright' blue.

In this way, Hayek argues, in addition to giving rise to the sensory world we experience, the mind can develop more abstract or 'symbolic' categories that represent qualities shared by certain concrete sensory experiences, such as 'brightness' (1952: 142-46). One important implication of this picture of (re)classification is that connections can be formed between nerve fibres that rarely if ever fire as the result of the same external stimulus but which are both stimulated as part of the following of some other (secondary) impulse. The formation of those connections that are thereby formed make possible the transfer of associations or sensory qualities from one kind of experience to some other experience with which that particular quality has never been directly associated, as when colours—as well as sounds or temperatures—are described as 'loud' or warm respectively. Such transfers—whereby qualities or attributes associated with one kind of experience or object are transferred to some other experience or object, with which they have not hitherto been associated—are, of course, a hallmark of metaphorical thinking. A metaphor is a figure of speech that involves someone speaking or writing about one thing (the subject of the metaphor) in terms that are conventionally associated with something else (the so-called vehicle of the metaphor). Metaphor is arguably central to creative thought because in attempting to make sense of the unconventional use of language involved in a metaphor, listeners or readers must explore how (if it all) the terms associated with the vehicle of the metaphor apply to the subject. In doing so, readers/listeners are encouraged to view that subject in new ways.

Consider, for example, a metaphor that is arguably central to Hayek's own thinking, namely 'The economy is an evolutionary system.' In describing the economy in this way, one is violating established linguistic conventions whereby evolutionary terms are predicated of biological rather than economic systems. Faced with such unconventional use of language, it is necessary to attempt to make sense of the metaphor by considering whether there really are sufficient similarities between the economy and the biological world to warrant thinking about economic life as an open-ended process whose development is driven by the differential survival and reproduction rates of the various (social) groups. It is necessary to consider, for example, whether there exist in the economic sphere entities (such as interactors and replicators) and processes (of variation, selection and replication) analogous to those involved in biological evolution. The search for such similarities will heighten people's awareness of, and so dispose them to notice, features of economic life of which they were hitherto unaware, thereby prompting them—perhaps quite literally—to see the economy in a new way (Lewis [1996] 1999; Lakoff 1993, 2008). In this way, the use of metaphorical language encourages people to think of one thing as something else, and to explore hitherto unperceived similarities between the two, generating novel (emergent) meanings and cognitive content, and thereby enabling people to see, think and talk about objects and situations in a new way (Lewis [1996] 1999: 89-90; Lakoff 2008: 21, 32; Fauconnier and Turner 2008: 54-55; cf. Butos and Koppl 2006: 40-43).

In terms of Hayek's model of the mind, what metaphor involves is the formation of connections between hitherto unconnected sets of neurons, one of which has until now been associated with the

subject of the metaphor, the other with the vehicle.[8] The forging of a connection between the two groups of neurons implies that sensory qualities and other, more abstract attributes associated with the vehicle can now be transferred to, and associated with, the subject of the metaphor, so that the latter is classified, viewed and understood in a new ways.[9] On this view, therefore, a metaphor is not merely a figure of speech or a linguistic ornament. Rather, it is the catalyst for, and linguistic manifestation of, a change in a person's underlying conceptual framework, whereby previously unconnected domains of thought—such as those pertaining to economic affairs and to evolution—become connected, so that our knowledge of the source domain (evolutionary systems, say) is mapped onto the target domain (the economy, in our example), thereby altering the way we view and understand the latter (Lakoff 1993, 2008).[10]

The significance of all this is twofold. First, it enables us to elaborate on and develop the descriptions, themselves metaphorical of course, that Shackle himself uses in describing creative human choice. As noted in section 2.1 above, Shackle argues that the creativity of human choice derives from and reflects the potential of human language to generate and give voice to new thoughts. What we can now see is that the generative potential centres on the use of metaphor to develop new perspectives on, and insights into, the world. Arguably, it is something closely akin to the generation of new meanings and insight by metaphor that Shackle also has in mind both when he describes new knowledge as being 'synthetic in the sense of bringing together ideas formally regarded as independent of each other' (Shackle 1994: 135). For Shackle, linguistic creativity—the scope for people to combine the given set of symbols that comprise a language in new ways to express new ideas—is analogous to entrepreneurial creativity, in the sense that both involve the development of new combinations of elements (whether they be linguistic terms or material goods) to create novel (emergent) meaning. More specifically, one facet of entrepreneurship is the creative combination of capital goods so as to form systems that have novel emergent properties (as for example when, suitably arranged, the components of an iPhone give rise to the emergent capacity to make phone calls, send and receive e-mails, etc) (Harper and Endres 2012; cf. Shackle 1979: 24-25, 63).[11] Second, and relatedly—but less abstractly—it is possible to elaborate on various examples documented in the literature on management to illustrate in a specifically economic context how metaphor does indeed play a vital role in the injection of novelty into the market process. More specifically, the importance of metaphorical language can be illustrated through case studies of concrete examples of entrepreneurship that illustrate how the use of metaphorical language was central to the creation of new products, in particular by making it possible for workers to make explicit their tacit sense of how new products can be designed (Nonaka and Takeuchi 1995). On this view, the operation of the entrepreneurial imagination involves a 'seeing as' (seeing one thing as, or in terms of, another), as when for example music entrepreneurs began to view turntables not simply as devices for playing

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[8] Hayek himself appears to acknowledge the importance of metaphor within his account of the working of the mind when he highlights the similarities between his account of human creativity and that developed by the Hungarian writer Arthur Koestler (Hayek [1969] 1978: 48-49).

[9] In Lakoff's words, 'conceptual metaphorical mappings … are realised by …brain circuitry' and, in particular, by 'neural bindings' or connections that link previously distinct neural structures (2008: 27, 23).

[10] As Aristotle, the first student of metaphor, put it, 'a good metaphor implies an intuitive perception of the similarity in dis-similars' (*Poetics* 1459a: 7-8).

[11] In Shackle's words: 'Material things will interact according to natural principles when brought together, as tools act on the substance when it is fabricated, or as seeds germinate in damp soil. But the applying of one thing to another is a decision of the individual, an act of the origination of history. Natural principles are brought into action by choices whose nature we are supposing to be that of *beginnings* ... Natural processes and the acts of individuals, seen from the standpoint of our chooser, are symbolic or typical entities set in a matrix of his own and others' choices, set in the mortar of these choices and as capable of being assembled into endlessly various forms as bricks are capable of being assembled into endlessly various buildings' (1979: 24, [1972] 1992: 280). In this passage, Shackle hints at the combinatorial elements in entrepreneurial creativity, just as he acknowledges the combinatorial element in linguistic creativity. However, in neither case does Shackle have the conceptual resources— in particular, the notions of metaphor and of emergence—fully to develop the idea that certain combinations (of words, or of material goods, as the case may be) can give rise to novel (emergent) properties.

recorded music but as music instruments, upon which music could be played live (Faulkner and Runde 2009).

4.3 Evolution and practical consequence.

In this section, the connections between Hayek's evolutionary conception of the mind and Shackle's notion of 'practical consequence' will be discussed, so as to show how Hayek's theory of the mind can do justice not just to the creative aspects of human activity but also to the way in which people's choices, though creative, are also sensitive to the constraints imposed by the nature of the social and material world within which they act. Not for nothing does Shackle refer to 'the Imagined, *deemed Possible*' (emphasis added).

On Hayek's account, people's expectations, and the pattern of neurons that embodies and gives rise to them, are tested by the effectiveness of the actions to which they lead. Neural connections that lead to expectations that tend to be confirmed, and thus seem to help the organism to achieve its goals, are reinforced, so their impact on people's behaviour becomes stronger, while neural structures that lead to expectations that tend to be disappointed become weaker so that their impact on people's behaviour diminishes. In this way, Hayek provides an account of how, in Shackle's words, people's 'practical conscience … broadly forbids self-deception … in the interest of the survival of the chooser' (p. 11; also see p. 15). On a Hayekian account, therefore, the term 'practical conscience' refers to the way in which, via an evolutionary process of selection, neural structures are reinforced, or whither, according to how successful they are in promoting behaviour that is well adapted to the prevailing context—embodied, for example, in the prevailing social rules—and which therefore enables a person to achieve his or her goals.[12]

We can elaborate on this point by considering how Hayekian theoretical psychology provides an account of the way in which the structure of people's mind is shaped by the social-structural context in which they find themselves, thereby helping to ensure that people's decision-making is attuned to the constraints imposed by the nature of the society—or the social Field, as Shackle terms it—they inhabit. For what the approach developed in *The Sensory Order* suggests is that repeated action in conformity with a social rule can—via social-psychological processes of habituation, imitation, conformism, and so forth—cause neurological changes that lead to the formation of new cognitive (neural) structures and, therefore, to people having new dispositions to conceptualise and respond to their circumstances in certain ways. In this way, social rules can become physically embodied in people, in the sense that people's experience of particular social rules shapes the arrangement of neurons found in their brains. Moreover, given that those cognitive structures dispose people both to interpret and perceive certain classes of external stimuli as constituting particular types of situation, and also to respond (often without conscious deliberation) to those situations by acting in the appropriate, socially sanctioned fashion, it can be seen that by moulding those neural networks social rules also shape—without uniquely determining—people's perceptions, expectations, and (ultimately) their actions.

**C**onsider from the vantage point provided by Hayek's theory of the mind a simple example, namely the way in which new drivers learn the rules of the highway code. Those rules specify the rights

[12] On this view, the mind is a set of rules whose principal function is to guide actions that promote the individual's successful adaptation to their environment. More specifically, Hayek's account is one in which configurations or structured groups of neurons can selected (or not, as the case may be) in virtue of their emergent capacity to classify the world in a way that enables the individually to adapt to, and navigate successfully his or her environment. On this view, knowledge is an evolutionary adaptation to the external world. The process of neuronal group selection is, of course, analogous to the process of group selection that Hayek believes accounts for the development of rule-governed social systems such as the market economy (Hayek [1967] 1967). For more on this, see Lewis (2014).

and obligations of the drivers who use public roads, thereby setting out how people who are drive cars on the public highway must interact with one another. In the case of a novice driver, the appropriate behaviour has to be consciously learned, so that the act of following the rules involves impulses travelling along nerve fibres in those parts of the brain associated with higher-order, conscious thought. Over time, however, as the external stimulus provided, say, by a red light becomes associated with a particular type of action—namely, bringing the car to a halt—connections form between the neurons stimulated by that external event and the motor fibres that fire when the subsequent response is taken, so that the neurons that previously had taken the stimulus into the higher-order nerve centres need not fire for the appropriate behavioural response to be forthcoming; the impulses passing through the receptor fibres stimulated by the red light cause the motor neurons associated with the act of stopping the car to fire, without the nerve fibres leading to the higher centres of the brain coming into play. The upshot is that the appropriate action will be taken 'automatically', without the involvement of the higher nervous centres, so that the rule will no longer be being followed consciously (cf. Hayek 1952b: 23-25, [1967] 1967: 73-74).[13]

What has happened is that the alteration in the neural structures of the brain—and, more specifically, the formation of a set of connections between the nerve fibres that receive and classify a particular type of sensory input and the neurons that produce the relevant type of behavioural response—has led to the formation of a new disposition, namely the disposition to stop at red traffic lights (and to expect others to do so), which causes the person in question both to interpret and respond appropriately to that aspect of their social environment without having to make a conscious decision to do so on each separate occasion, and also to expect others to do likewise (cf. Runde 2002: 22-25; Butos and Koppl 2006: 40; Elder-Vass 2007c: 334-37). It is just this sort of process of disposition-formation that Hayek describes when he writes that: '[S]ome learned responses may, after sufficient repetition, become almost completely automatic and be effected at low levels [of the neural system]' (1952: 92):

> [T]he formation of abstractions [dispositions] ought to be regarded not as actions of the human mind but rather as something which *happens to the mind, or that alters the structure of relationships which we call the mind*, and which consists of the system of abstract rules which govern its operation. In other words we ought to regard what we call mind as a system of abstract rules of action (each 'rule' defining a class of actions) which determines each action by a combination of several such rules; while every appearance of a new rule constitutes a change in that system, something which its own operations cannot produce but which is brought about by extraneous forces. (Hayek [1969] 1978: 43, emphasis added.)

This shaping of people's dispositions by the context in which they are situated, so they become adapted to the social rules that constitute the contours of the (social) Field they inhabit, is precisely what is involved in the development of the kind of 'practical consciousness' described by Shackle, for it involves people becoming attuned to the constraints imposed upon their actions, and the opportunities afforded to them, by the (in this case, social) Field in which they live. Thus, the way in which people exercise the creative powers of their imagination so as devise the goals they will to pursue is tempered by an awareness of the

[13] It is important to add two qualifications here. First, although experienced drivers may follow the rules of the highway code unconsciously, they will of course still be able to give an explicit account of why they stopped at a red light if they are called upon to do so. Second, while the formation of the new disposition creates a causal *tendency* for people to stop at red lights, it does not casually determine their actions in the sense of compelling them to stop on each and every occasion they see a right light. The reason is simple: the causal impact of the disposition in question may be offset by the countervailing causal power of other dispositions. For example, if a person were driving his/her seriously injured spouse to hospital, then that person's propensity to stop at red traffic lights might be overcome by the countervailing force of his/her desire to save his/her loved one (Hayek 1952: 23-25, [1969] 1978: 41, 48-49).

constraints imposed upon their actions—and the consequences thereof—by the (nature of the) world, so that the set of projects from which people choose does indeed become limited to those that are, in Shackle's worlds, 'deemed Possible'. Hayek's theoretical psychology thus provides an account of cognitive activity that permits just the kind of constrained creativity invoked by Shackle.

## 5. CONCLUSION

It has been argued above that *The Sensory Order* provides a theoretical psychological foundation for Shackle's ideas about the mind. Hayek's account of the working of the mind makes it possible both to overcome the problems posed by Shackle's Cartesianism and also to develop Shackle's ideas about expectations-formation, creativity and practical conscience in fruitful ways.

A slightly different way of looking at the argument presented above is to think of it as developing an answer to the following (transcendental) question: what must the world be like if choice, as Shackle understands it, is to be possible? There are two aspects to this question, each of which concerns a different part of the world. The first, which is addressed above, concerns what Shackle's account of choice presupposes about the nature of human mind and asks whether it is possible to devise a plausible account of the working of the mind that is consistent with, and therefore provides a grounding in theoretical psychology for, Shackle's account of choice. The argument advanced above suggests that Hayek's theoretical psychology does indeed offer one such account.

The second aspect of an answer to the transcendental question centres on what the external (non-mental) or social world must be like for creative, originative choice of the kind described by Shackle to be possible. It has been argued elsewhere that addressing the second of these two questions indicates that Shackle's account of the nature of the social world also requires development. Briefly, as Shackle himself acknowledges, the possibility of creative human choice presupposes that people have some idea about the outcomes to which their outcomes might lead. However, according to Shackle, the only possible objects of such knowledge are the very same event regularities—regular associations between actions and outcomes—whose existence is undermined by creative entrepreneurial choice. So Shackle's own account of the nature of the social world—and, more specifically, of the nature of the social institutions that inform and guide people's choices—arguably undermines his own account of the possibility of creative human choice (Runde 1996; Latsis 2015). This is a significant point in the current context because it underlines the point, which should not be lost sight of, that for all the compatibility between Shackle's account of choice and Hayek's theoretical psychology, there remain very important differences between them. Hayek in particular develops a much richer account both of the institutional context in which people act, and also of how institutions articulate with the human mind and human agency. But that is a story for another paper (Fleetwood 1995; Lewis 2012, 2104).

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